



**A Report on the work done by
the Locust Research Staff under
the Locust Research Entomologist
to the Imperial Council of
Agricultural Research at Karachi
during the year 1934.**

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A REPORT ON THE WORK DONE BY THE LOCUST RESEARCH STAFF UNDER THE LOCUST RESEARCH ENTOMOLOGIST TO THE IMPERIAL COUNCIL OF AGRICULTURAL RESEARCH AT KARACHI DURING THE YEAR 1934.

By Rao Sahib Y. Ramchandra Rao, M.A., F.R.E.S., Locust Research Entomologist.

RA

I.—UNIVERSITY

1. *Locust Research Scheme as Locust Research Entomologist at Karachi during the year under report with the exception of a period of about three months from the 18th August to the 7th November, 1934, during which I was on deputation out of India to attend the Third International Locust Conference held at London in September, 1934. During this period, Dr. K. R. Karandikar, Ph.D., F.R.E.S., was placed in charge of the work in addition to his own duties as Assistant Locust Research Entomologist, Pasni.*

2. *Ecological Staff.*—Dr. K. R. Karandikar continued to be in charge of the ecological work at Pasni and Ambagh Field Research Stations with headquarters at Pasni. Mr. Atul Chandra Sen, M.Sc., Locust Research Assistant, worked at the Pasni Field Research Station, throughout the year while Syed M. H. Taqi Ahsan, M.Sc., who was appointed Locust Research Assistant in April, 1934, was placed in charge of the work at Ambagh.

The Locust Survey Staff. 1. *Khanpur Circle* with headquarters at Khanpur, Bahawalpore State. Mr. Keshodas Baweja, M.Sc., was, as in the previous year, in charge of the survey work in Dera Ghazikhan, Bikaner and north Jaisalmer desert areas, with two Fieldmen stationed at Khanpur and Bikaner respectively under him. As recommended by the Locust Committee in January, 1934, a new Field Observation Post was opened in July, under the orders of the Imperial Council, at Sardarshahr, in Bikaner State, with a Fieldman working under the supervision of Mr. Keshodas Baweja attached thereto, for the purpose of carrying out intensive survey work roundabout and of recording meteorological data throughout the year.

2. *Mirpurkhas Circle*—(Headquarters changed recently from Mirpurkhas to Hyderabad (Sind) in October 1934). Mr. Desraj Bhatia, M.Sc., continued to be in charge of the survey work in Sind, south Jaisalmer, South Marwar and Cutch areas with two Fieldmen under him stationed at Rohri and Mirpurkhas. As decided by the Locust Committee, a new observation post was opened in the centre of the desert area at Chachro from May 1934 under the supervision of Mr. Bhatia, with two Fieldmen attached thereto for attending to intensive survey work roundabout and to the recording of meteorological data.

3. *Mekran-Lasbela Area.*—The four observation posts at Gwadar, Ormara, Turbat and Sonmiani continued to function throughout the year under the general control of Dr. Karandikar. The observation post at Sonmiani was attached to the Field Research Station at Ambagh. The supervision of the survey work in Mekran and Lasbela areas was, as decided at the meeting of the Locust Committee in January, 1934, delegated to Locust Research Assistant, Mirza Ahmad Ali Khan, stationed at Karachi.

Compiling Staff.—Mr. Chandar Parkash, B.Com. and Mr. Shantilal continued to work as Compiling Assistants throughout the year.

II.—ITEMS OF LOCUST RESEARCH WORK IN PROGRESS DURING THE YEAR.

1. *The Ecological Study of the Solitary Phase Locust.*—A. Pasni : as centre for the winter-rainfall areas of the Mekran Coast.

B. Ambagh (Sonmiani) : as centre for the summer rainfall areas of the Mekran Coast.

2. *Distributional Survey of the Locust Areas*—

A. Khanpur Circle : Survey work in Dera Ghazikhan, Bahawalpore, Bikaner, north Jaisalmer and surrounding areas.

B. Mirpurkhas Circle : Survey work in Sind, Kachhi, south Jaisalmer, Jodhpur, Cutch and neighbouring areas.

C. Ambagh Circle : Survey work in the Lasbela Area.

D. Mekran Circle : Surveys in Panjgur, Kolwah, Kech, Dasht, Kulanch and the Coastal Reks.

3. *Study of Locust Movements during the year.*

4. *Study and Compilation of Old Locust Records ; Mapping the Locust Data.*

5. *Study and Correlation of Meteorological Data.*

6. *Study of the Fauna and Flora collected ; and of the Locust Collections.*

III.—SURVEY WORK.

Tours.—As in 1933, more or less regular beats were arranged for the Fieldmen in the areas allotted to them so that all the places important from the point of view of locusts might be visited 3 or 4 times during the year, so as to note the effect of the seasons on the locust population. The Assistants usually joined them on alternate tours.

At the Field Research Stations at Pasni and Ambagh, and at the Desert Observation posts at Chachro and Sardarshahr, regular intensive surveys were made within a radius of about 5 to 10 miles. At the Observation Post at Gwadar also, the Field man made regular periodical surveys of the "reks," while at headquarters. In addition, longer surveys of about 50 miles' radius were also periodically undertaken at Chachro, and as far as possible around Sardarshahr (considering the limited staff there).

In addition to the ordinary beats, the following long tours were carried out by the Survey Assistants accompanied by the respective Fieldmen :—Mr. Keshodas Baweja : (1) A tour from Anupgarh in Bikaner State right across the deserts of Bikaner, Jaisalmer and Sukkur, *via* Pugal, Barsilpur, Nachna, Mohangarh, Jaisalmer, Khuiala, Shahgarh, Piarawaro Tar to Rohri in February—March 1934, and another, (2) across the Shekhawati desert in Jaipur State from Sikar to Churu in September. Mr. D. R. Bhatia visited all the desert areas in Thar-Parkar and South Marwar in February—March, and toured in Cutch twice, once in May and again in October. Mirza Ahmadali Khan travelled from Karaehi to Bela, thence on camels across South Jhalawan *via* Goko Pat and Nundara to Awaran, and thence toured in Kolwah Panjgur, and Kech areas by motor-lorry kindly supplied on hire by the Assistant Political Agent, Mekran, April—May 1934.

Owing to illness, some of the Fieldmen were absent on leave for considerable periods, and since it was not possible in many cases to find substitutes in their places, some of the projected tours could not be carried out.

Statement A—I, II, III and IV—contains lists of the tours actually carried out during the year in the different circles all of which have been serially numbered for reference.

Results of Locust Surveys.—The results of the various tours have been tabulated and presented in *Statement B*. In these tables, only those places where locusts were encountered have been included, and the date of collection and the numbers noted have been shown. The results have, moreover, been classified according to the seasons, so that the effect of the seasons on the locust population is fairly clearly seen. Figures for Mekran and Lasbela Reks have been included in *Statement B*-(1), while those for the Mekran Hinterland in *B*-(2), for the northern desert areas of N. W. India (mostly Khanpur Circle) in *B*-(3), and for the southern areas (mostly Mirpurkhas Circle) in *B*-(4).

Before discussing the results of these surveys, the character of the seasonal rainfall in 1934 might be first briefly reviewed, since rainfall is an important factor in locust economy.

Weather in the Desert Regions of N. W. India in 1934.

Winter-rainfall.—During the winter and spring season of 1933-34, 53 western disturbances passed from the direction of Iraq, over Persia, the Persian Gulf Region, Baluchistan and N. W. India between October 1933 and the first week of June 1934, but did not result in effective rainfall except in a few places. Along the coastal areas of the Persian Gulf and Mekran, there was very little rain, except in the Jask sector of Persia, where 5 inches of rain fell in March, and roundabout Bahrein and Sharjah. In British Mekran, some rain was registered in the interior of Mekran in March, while none was recorded on the 'reks' of the Mekran coast.

In the areas of the Indian Desert, scattered thundershowers appear to have fallen over the Jaisalmer and Bikaner areas, and to a smaller extent in the Thar-Parkar desert, during the second and third weeks of March. While at Bikaner the rainfall in March measured only about $\frac{1}{2}$ inch in all, Hissar at the eastern fringe of the desert received about $4\frac{1}{2}$ inches in that month. As thundershowers are sporadic in occurrence and vary in intensity from place to place, it is not improbable that some heavy falls might have occurred in parts of the desert. There was some rainfall in the Dadu-Larkana area also about the same time.

On the whole, there was a serious failure of winter-rainfall in the Mekran area.

Summer-rainfall.—During the pre-monsoon period, there was but little rain-fall, and very high temperatures were recorded in the first fortnight of June in the desert areas, but the monsoon extended into Western Rajputana, Sind and Lasbela rather early. Good showers were received in the last week of June and the first week of July. There was a considerable break later on in July, but in August heavy rains were received in Rajputana, and though they did not make their influence very much felt in Sind and Lasbela, some good showers appear to have fallen in the hinterland of Mekran in Panjgur and Kolwah. The monsoon withdrew rather early and there was very little rainfall in the desert areas in September.

Results of the Survey Work in 1934.

In examining and comparing the statements of locust findings in different parts of the locust areas and at different seasons, it may be stated that the figures of locust finds noted therein serve merely to give an index to the relative density of the visible locust population. They cannot, however, be considered to give any absolute values. Negative results do not mean that locusts are entirely absent, but only that they were not noticeable, and, therefore, they do not have the same values as actual finds, which are positive data in regard to locust occurrence. Most of our surveys have been of the extensive kind, and though intensive surveys would have been more valuable in furnishing data, they could not be undertaken on account of the vastness of the areas to be covered.

The values of the results of surveys have also to be judged by the following considerations :—(1) In the cold season, locusts are not active except at mid-day. (2) In cloudy weather and when heavy winds prevail, they usually retire into the interior of bushes. (3) In summer, when the weather is very dry and hot, they seek shelter from the sun in the shade of bushes, and are not easily detected. Hence the low counts or negative results recorded in really cold weather or during unfavourable weather conditions would not be of much significance.

Locusts—in their non-gregarious condition—are usually to be found scattered over a large area, and if good numbers are to be seen at any particular place, the concentration may be brought about in connection with pairing and egg-laying, or less usually for feeding, or may be an indication of the recent development of a new brood.

1. *Breeding in Winter-rainfall areas.*—No indications of breeding were noted anywhere on the Ormara, Pasni, Gwadar, and Pishukan Reks, and observations made by the survey staff show that locusts did not breed anywhere in the hinterland of Mekran, e.g., Dasht, Kulanch, Kech, Kolwah or Panjgur. This is clearly attributable to the failure of winter and spring rains in these areas, vide Statements (C) & (D).

There was no summer rainfall of any consequence on the coastal 'reks' westwards from Ormara. The interior of Mekran, on the other hand, appears to have had, to some extent, an extension of the influence of the monsoon, appreciable rainfall being reported from Panjgur and Kolwah in June and August. Whereas very few locusts were noticeable in Kolwah, Panjgur and Kech in April and May, a fair number was seen in Kolwah in July, in the Panjgur area in August and November, and in the Kech valley in July and November. It is difficult to say definitely whether any summer breeding had occurred in these areas, but the general indications are, however, that it had taken place to a small extent.

2. *Breeding in summer-rainfall areas.*—In the Lasbela area no spring brood was noticed in the places surveyed. In western Sind, the Fieldman reported that he had found a few yellowish and some pinkish specimens of the locust in the Dadu district in April. Since a few showers had been received in this area in March, it is possible that some breeding had occurred here. In the Rajputana region, a rise in population was noticed in the Pugal-Bikaner area of Bikaner and in the Nokh-Baru area of Jaisalmer in May and June. The specimens collected were straw-yellow in colour and were probably of the

new brood developed in spring, but they had already assumed a yellow tinge in their hind wings. It is possible that they had developed from eggs laid in these areas after the fall of thundershowers recorded in March.

With an early extension of the monsoon into Rajputana, Sind and Lasbela, breeding commenced in these areas by the end of June. Green hoppers were noticed in July around Chachiro and in the Ambagh-Naka Kharrari area, and continued to be found throughout August. The new brood adults were noticeable early in August. Around Bikaner, at Derawar in Bahawalpore State, and in Thar-Parkar desert generally, although hoppers were not detected, the adults of the new brood were found during August. In the Dera Ghazikhan area Mr. Keshodas found green hoppers in small numbers in sandy areas near Dera Ghazikhan, Taunsa and Tibbi Karsani, mostly on bushes of *Aerua javanica* (loc. name. 'Boo'), as was the case also around Chachiro. While in Lasbela and the Indian Desert generally, the breeding occurred as early as June, in Dera Ghazikhan it took place in October, which was the case in 1933 too.

On the Ambagh-Naka Kharrari reks, breeding in 1934 was, as compared with that of 1933, earlier but of a more limited extent. While in 1933, the locust population had increased very greatly by October, the increase was comparatively small in 1934. In the Hingol area, especially near Pohr, an increase in numbers was noted during the surveys made by the Fieldman in September and November, but hoppers had not been looked for nor had the condition of the adults been noted. Here is another instance where the proper supervision of a Survey Assistant would have been of value.

3. *Number of generations in the year.*—While on the coastal Reks in Mekran there was no breeding whatever during the year, in the interior of Mekran, the available data give vague indications of a limited summer breeding. In the Lasbela area, breeding occurred in summer and was definitely limited to a single generation, which appears to have been the case in general in Bahawalpore, Dera Ghazikhan and Thar-Parkar.

In parts of Bikaner and Jaisalmer and in Dadu district, limited spring breeding appears to have taken place, in addition to which a fair amount of breeding occurred in Bikaner and east Jaisalmer during the monsoon period, two generations of the locust having thus occurred in this area this year.

In the course of intensive work around Chachiro, Mr. Bhatia records that he had found hoppers in the field (*vide* Statement G), as late as the first fortnight of October, and has suggested that these might represent the second generation of the locust, produced by the earliest adults of the first generation emerging in August and becoming mature by the end of that month. Though this need not be deemed to be outside the range of possibility, the fact that he found the adults of the old generation persisting till the end of August indicates that the hoppers in question were more likely to have been the progeny of some of these adults.

4. *Migration among Solitary Phase locusts.*—During the year under report, no definite evidences of migration among the non-gregarious locusts were noted. There were some indications that local migrations had taken place during the year in certain peculiar situations, as for instance, from the desert-fringes into the interior of the desert, and *vice versa*.

At Chachiro, and generally in the whole of Thar-Parkar district, no locusts had been noticed during surveys in March and April. At Chachiro the first locust specimen noticed was found on the 19th May, and five more were collected during June. With the onset of the rains, larger numbers were found

during July at Chachro, but very few were noted in certain parts of the Thar desert, such as Mithi and Diplo talukas. It is not clear whether the locusts found after May are to be considered to be immigrants from outside or to have emerged from hiding in bushes with the seasonal rise of atmospheric humidity in May. Possibly further intensive surveys may give definite clues to a solution of this question.

Mr. Bhatia mentions in his report for August, 1934 that a heavy wind storm had occurred at Chachro on the 12th August coming from the south-eastern direction, and that in the course of surveys carried out after this date 13 specimens of locusts of a bright yellow colour were collected along with others of the usual grey colour. He suggests that these might have belonged to small swarms of the gregarious phase that had been carried in by the wind. A biometrical examination cursorily made has, however, shown that the yellow specimens do not possess any marked *gregoria* facies.

In the case of the Mekran reks, the locust population of the reks, especially of Gwadar, Pishukan and Hingol, had increased in April—May, in spite of the absence of breeding, while in the hinterland very few locusts were noticeable at this time. On the other hand, with the fall of rain in the interior in June a decrease in number is to be seen on the coast as well as a certain degree of increase in the hinterland. This possibly may be interpreted as being an indication that general movements of the solitary locusts were possibly afoot at these times. In this connection it may be recalled that under more or less similar conditions in May 1932, an incursion of scattered yellow and pink locusts from the interior of Mekran into the Pasni Rek had been recorded. Definite information about such movements may possibly be obtained by liberating coloured locusts on the reks and noting the date and place of their re-capture.

5. *Other locusts*: 1. *Patanga succincta*.—A few specimens of the Bombay Locust were collected near Mandvi in Cutch as in 1933.

2. *Locusta migratoria* ph. *solitaria* was observed all over the desert areas in small numbers and was collected also from certain places in the Punjab and Sind. Mr. Bhatia reports that he found hoppers of this species in the neighbourhood of Rahim-ki-bazaar in Thar-Parkar district. It might be interesting to observe whether this species would be affected by the more moist conditions brought into existence in Sind and the Punjab by the new irrigation systems.

3. *Anacridium aegyptium* and *Cyrtacanthacris tatarica* were found in small numbers in many places by the survey staff.

IV.—ECOLOGICAL STUDIES.

1. *Pasni Field Research Station*.—As instructed plans and estimates were prepared and tenders called for, for the erection of the buildings sanctioned for housing the laboratory and the Research staff on the Pasni Rek. Construction will be begun as soon as final sanction is obtained.

As suggested at the last meeting of the Locust Committee, a large wooden cage fitted with copper wire-gauze was prepared and sent to Pasni in July. It was designed with the help of plans received from Mr. P. B. Richards, Government Entomologist, Cawnpore and was constructed as two independent units each 33 ft. long, 16½ ft. broad and 6 ft. high, and partitioned in the middle to form two equal compartments 16½ ft. square. The cage has been so made as to be capable of being dismantled and set up without much difficulty at a different place, if required later on. The total cost of the cage has amounted

to about Rs. 1,600, but it should have cost less had it not been damaged by the roughness of the seas at the time of unloading on the Pasni Roads, so that the wire-gauze had to be replaced in several places. It has now been set up on the Pasni Rek, but as the vegetation had dried up everywhere owing to the drought, the bushes inside the cage had to be watered specially. As there was no supply of locusts available in the field, reared locusts had to be introduced for starting observations.

Detailed results of the ecological studies are included in the report of the Assistant Locust Research Entomologist, and my remarks will be confined to a few general observations on the experiences of the year under report.

Locust breeding was not observed anywhere on the reks during the year owing to the failure of both winter and summer rainfall. Though the initial population of locusts was fairly high, the numbers diminished gradually until at the end of the year none could be seen at all. In the cages, however, the desert locust went through four generations during the year under semi-natural conditions, by reason of the provision of moist sand at the bottom of the cages. At Gwadar, the latest period when hoppers were observed was in July 1933, and since a few adults were noted as late as October on Gwadar and Pishukan reks, it may be surmised that the longevity of an adult locust may extend up to 15 months, unless indeed they happen to prove to be immigrants from the interior of Mekran.

On account of the prevailing drought, even in the special areas of the Pasni reks, the soil-moisture was too low for breeding.

It would be interesting to watch whether locusts would reappear again in case winter rains are received during the current winter season, and if so, to note wherefrom they would appear.

2. *Ambagh Field Research Station.*—Eco-climatic observations were made at Ambagh only from May after Mr. Taqi Ahsan took charge of the work. A statement of the observations made is attached (*vide* Statement F.). Rains commenced early and on the 26th June, the first fall was recorded. There was a total fall of 2.16" in June, 1.10" in July and 0.97" in August and a total of 4.23" for the year. Compared with last year's fall (13.40"), the year's record is low, and the breeding has been also relatively limited. Third instar hoppers are reported to have been collected on the 30th July, and the date of the earliest oviposition was probably about the end of June or the beginning of July, thereby showing that oviposition had occurred almost immediately after rainfall. During July, the average soil-moisture at 4" depth was 4.20 per cent., while in August it had decreased to 2.54 per cent., so that the conditions were not favourable for oviposition and development. The adults of the new generation began to appear in August. They did not show any decided pink colouration as was noted in October 1933. Mr. Taqi Ahsan reports that starlings appeared on the reks during July August, but was not able to make any positive observations in regard to their attacks on hoppers or adults.

Pasni Research Station had the honour of a visit by the Hon'ble Mr. B. T. Gould, I.C.S., Officiating Agent to the Governor-General in Baluchistan, accompanied by Mr. C. F. Squire, I.C.S., Political Agent in Kalat, Captain Saiyid Khurshid Alam Khan, Assistant Political Agent, Mekran, Khan Sahib Sherzaman Khan, Naib Wazir-i-Azam, Turbat and Sardar Bahadur Sardar Bhai Khan, on the 9th November, 1934.

8. November—II week . . . Yellow and pink coloured locusts found flying over village Suket in Kotah State in the second week of November.
Official Report.
9. November, 1933. . . . Light swarms reported by local people to have been found flying along the coast of Cutch from east to west, according to Mr. Bhatia.
Unofficial.
10. January 1st, 1934 . . . Locust swarms had appeared at village Seona, Tahsil Bhicangaon, District Ninat, Indore State on the night of 1st January, and disappeared.
Official.
11. February 26th, 1934 . . . A swarm of locusts appeared in village Jhotana, Katosan Taluka, Sabar Kantha Agency, Western India States on the 26th February, 1934 flying from east to west, without alighting on the ground.
Official Report.
12. July 20th, 1934 . . . A swarm of locusts reported to have appeared in the Puranpur Tahsil, Pilibhit district, United Provinces, in the evening on the 20th July entering the Tahsil from the east and passing on to the west without alighting on the ground.
Official Report.
13. 10th September 1934 . . . Locusts reported just north of the Hindu-Kush; a few swarms visited the Malakand Agency. (Probably *Docostaurus maroccanus*—the Moroccan Locust).
Official Report.

A study of locust movements in the areas of Rajputana, Central India and Western India States during years of locust activity shows that in the autumn and winter months the trend of locust flights is usually to the east and the south of Rajputana. Although actual specimens have not been secured in the case of any of the reports received in 1933-34, the direction of flights, wherever it has been mentioned, shows the same trend. Since it is known that, in consequence of the heavy rains received over the Indian Desert, a considerable breeding of the solitary phase type locusts had taken place in the deserts in Bikaner and Jaisalmer areas, it is not unlikely that small swarms had originated therefrom and had flown in various directions out of the Rajputana area.

In addition to the above reports, there were two newspaper reports of locust occurrence in the Karachi district one in January and the other in September. Both of them proved to be incorrect, the first one being found to be referable to flights of starlings, and the other, to common grasshoppers.

VI.—STUDY OF OLD RECORDS.

The following records were perused and information on locusts compiled therefrom :—

1. Locust Files from Mukhtarkars of Sinjhora, Sukkur, Garhi Yasin, Ghotki, Rato Dero, Khipro and Jacobabad.
2. Locust Files from Deputy Commissioner, Upper Sind Frontier.
3. Locust Files from Deputy Commissioner, Hissar.
4. Locust Files from the Imperial Entomologist, Pusa.
5. Locust Files of Jaipur State.
6. Locust Files of Outeh State.
7. Locust Files of the Naib Wazir-i-Azam, Turbat for 1908—1922.
8. Bombay Government Gazette—Cotton Reports, 1850—1871.
9. Bombay Government Gazette, Season and Crop Reports, 1872—1933.
10. Administration Reports of the Bikaner State, 1903—1930.
11. Administration Reports of the Rajputana Agency, 1890—1903.
12. Administration Reports of the Bahawalpore State, 1899—1930.

Compilation of information extracted in previous years from the following was attended to :—

1. Kalat State Records for 1911—22 and 1928—31.
2. Jodhpur Locust Registers, 1930-31.
3. Jaisalmer Records, 1894—1907.
4. Baluchistan Agency Diaries, 1900—1931.
5. Baluchistan Administration Reports, 1887 to 1931.
6. Cotes' Report on the Locust of North West India, 1869—1890.
7. Sind Official Gazette—Season Reports, 1872—1933.
8. Punjab File containing information for years 1869 to 1925 extracted by the (then) Locust Research Entomologist Lyallpur from the Punjab Season and Crop Reports and lent for perusal.
9. Khelat Diaries in the Foreign and Political Department Imperial Records Library, Delhi, 1878—1880.

In addition to the above, all the volumes of the Sind Official Gazette kindly lent for perusal by the Office of the Commissioner in Sind, Karachi, were gone through personally by me and the information available therein thoroughly studied, and all available data in regard to the rainfall in Sind for the years 1874 to 1933 extracted.

Locust Invasions in Sind during the period 1869—1933.—The information collected from the Season and Crop reports in the 'Sind Official Gazette' beginning from the year 1872 was examined in detail during the year and tabulated. Rainfall figures for the various years was also gathered as far as possible for purposes of correlation. The information given on locusts in the season reports is generally scanty, but in certain cases the directions of flights are indicated and sometimes data on breeding are also included. During the last locust outbreak, however, fairly detailed data have been obtained for Sind in

regard to the seasonal direction of locust movements, and these have been of service in the interpretation of the scanty data for past years. An analysis of the data gathered from the Season Reports would appear to show that, during years of locust invasions, Sind has been the scene of two series of locust movements almost every year:—one, in the pre-monsoon months of April, May and June, when the entry of fresh locust swarms from a western direction is recorded, first in the more western towns, such as Jolii, Mehar, Shikarpur or Jacobabad, and in later weeks in more easterly places and last of all in Thar-Parkar desert, and the other, from September onwards, when the incursion from an eastern direction of large swarms of pink locusts is indicated, which, after causing much damage to crops, gradually move on westwards towards Baluchistan. In years of good rainfall, oviposition would appear to occur in Sind, otherwise the swarms appear to move on during the rainy season into Rajputana for egg-laying and breeding.

During the past 65 years covered by the Sind Official Gazette data, locust invasions seem to have occurred in definite cycles, separated by distinct breaks. The first cycle extended from 1868 to 1881, during which period there were two or three short interruptions lasting about a year or two and clearly referable to deficient rainfall.

There was then a long break from 1882 to 1887. In 1888, a few locusts were recorded in Sind, and from 1889 onwards there was a long period of locust activity lasting up to the end of 1907. The break was a short one, extending from 1908 to 1911. The next cycle from 1912 to 1919 was, comparatively, not a vigorous one, and was followed by a period of locust quiescence of about 6 years—1920 to 1925. The recent 1926—1931 outbreak—which was spread over many countries of Asia and Africa, and the severity which is still within memory, has been succeeded by a period of locust inactivity, of the probable duration of which no statement can be made except that it has already lasted three years.

Attempts have been made to correlate the rainfall data with the fluctuations in the intensity of locust activity, and, in general, it would look as if the earliness and amplitude of winter and monsoon rains have a direct influence on the time of appearance and the magnitude of the spring and autumn swarms, respectively, in Sind. Breaks in infestation may be caused by the failure of winter or summer rainfall, and sometimes also by excess of rainfall. In most years, infestation starts by the entrance of swarms originating from the west, and Baluchistan is probably more important in starting outbreaks than Rajputana.

The Punjab data for the above period—1869 to 1925, which had been kindly lent by the Punjab Government Entomologist, have been cursorily perused, and it has been found that the locust cycles tally with those indicated by the Sind data. They require, however, to be studied in detail in correlation with the Sind data, after collecting information for certain years, which were lacking in the file received.

Data from the Bombay Government Gazette—1850 to 1933.—The data collected recently by Mr. Chandar Parkash from the Season and Crop reports in the old volumes of the Bombay Government Gazette have yielded much valuable information. Bombay Presidency proper is an area subject to the depredations of both the Desert Locust and the Bombay Locust (*Patanga succincta*), but while the flights of the Desert Locust, which are limited to Cutch and Kathiawar in years of ordinary invasions, reach the south of the Presidency only at times of extraordinary multiplication, the Bombay Locust has its home on the hill ranges of the Presidency. During years of activity, the

locust invades the whole of the Presidency proper, and extends its flights to the Central Provinces, the Hyderabad State and Madras Deccan. It is, therefore, in some cases difficult to make out which of the two species is referred to in the season reports. From the data collected the following statement may be made, in regard to the cycles of activity of the Bombay Locust :—

1873 to 1884 were years of activity of this locust, with a peak of development in 1883, and with two interruptions in 1876-77, and in 1880—both of them, times of drought in the Deccan.

This was followed by a long break from 1885 to 1896. The next cycle of activity was from 1897 to 1911 a long period with a few breaks in the middle. The peak of multiplication was reached in the years 1903, 1904, 1905 and 1907. From 1912, the locust seems to be in a state of quiescence, but references to damage by locusts in the south of the Presidency to be seen in the season reports of 1914, 1915, 1920, 1922, 1925 and 1926 may possibly be to this species, and definite information on this subject may possibly be obtainable from the Bombay Agricultural Department.

Since this Locust has proved a menace to agriculture in Peninsular India, it may be advisable to have its breeding areas properly investigated during its present phase of minimum activity.

VII.—CORRELATION OF METEOROLOGICAL DATA.

The following data were collected during the year from the records of the Government Meteorologist, Karachi, for the purpose of correlating them with locust movements :—

1. Rainfall data for stations in Mekran from 1911 to 1932.
2. Rainfall data for stations in Sind for 1875 to 1933.
3. Rainfall data for all important stations in Rajputana, Sind and Baluchistan for 1900 to 1932.
4. Rainfall data for all available stations in the desert area from 1850 to 1899.
5. Relative humidity data for stations in the desert area for the years 1926-1933.

VIII.—PUBLICATIONS.

I submitted the following two papers to the Third International Locust Conference : 1. "Summary of Locust Research Work carried on in North-West India under the auspices of the Imperial Council of Agricultural Research in India". 2. "The life-cycle of the Locust, particularly sexual maturation, in relation to climatic and other factors". Dr. Karandikar submitted a paper on "Studies on the Ecology of the Desert Locust in Southern Baluchistan" for publication during the year.

IX.—COLLECTIONS.

A good many of the collections of insects made during survey work were sent to the Imperial Institute of Entomology, London, and were received identified. Acridiids specially received attention and all the grasshoppers in the collection were classified and arranged according to their identifications. Some work was done by Dr. Karandikar in working out the biometrics of the locust specimens in the collections, and I took a large collection to the

Imperial Institute of Entomology, London, and attended to the measurements of about 500 specimens of locusts there according to the methods approved by the Locust Conference. During the year, a large number of plants sent for naming were returned identified by the Curator, Royal Botanical Garden, Calcutta.

X.—THE THIRD INTERNATIONAL LOCUST CONFERENCE.

Under instructions from the Imperial Council of Agricultural Research, I sailed from Bombay on the 18th August, 1934 and reached London on the 1st September for representing India at the Locust Conference. The Conference commenced on the 11th September and concluded its sittings on the 18th September. It was represented by 13 countries interested in Locust Research and was composed of over 50 delegates and advisers. From the 19th September I worked at the Imperial Institute of Entomology, London, engaged in making a biometrical study of a large collection of locust specimens—apparently all “solitary”—collected at different times and places in the course of survey tours in Baluchistan, Sind and Rajputana, and S. W. Punjab, during the years 1931-34. After visiting the laboratories at Rothamsted, Cambridge, Farnham Royal and Slough, and the Entomological museums and laboratories at Paris and Portici, I sailed back to India *via* Marseilles and arrived in India on the 7th November. I visited Poona on the 8th and the 9th for consulting Dr. C. W. Normand, Director of Meteorological Observatories in India and Dr. L. A. Ramdas, Agricultural Meteorologist in regard to the meteorological issues raised at the Conference and returned to Karachi on the 12th November.

The technical aspect of the various resolutions adopted at the recent Locust Conference is being reported on separately, but it may be useful to review some of the important issues briefly. One of the main outcomes of the Conference is a clarification of ideas in regard to terms variously and vaguely referred to in locust literature as “homes of the locust” and “permanent breeding grounds”. It has now been suggested that the areas in which locusts are found in a solitary or non-gregarious state should be regarded as its “areas of distribution” or in French as “aires d’habitat” and since it is only in certain restricted parts of this large area of distribution that the ecological conditions needed for the transformation of the solitary phase into the gregarious can come into existence, it has been decided that such centres should go by the name of “outbreak centres” or of the more expressive French term, “foyers gregarigènes”.

Territories subject to visitations are to be divided into (1) areas of *normal migration*, (2) areas of *occasional migration*, and (3) areas of *exceptional invasions*, and on this subject as also with reference to the fixation of “outbreak centres” in the Indo-Persian area, there is likely to be matter for much controversy in the present state of our knowledge.

Adverting to the subject of the formation of the initial swarms in the case of the Desert Locust, it is not clear whether it is a gradual increase of population in the course of successive good seasons, or a rapid succession of generations in a favourable year, that leads to it. It is a subject that needs a careful study.

In regard to migration, we have in India a number of fairly accurate records of locust movements made during the recent locust cycle, and a correlation of these with available data of the meteorological department may possibly lead us to some useful conclusions as to the various factors generally affecting locust migrations.

" With reference to the subject of the methods of field surveys employed in Locust survey work for noting the comparative density of the locust population and of the plant associations, it may be stated that on account of the sparseness of the population and the vast extent of the areas to be examined, only extensive surveys have been made. Intensive surveys are not likely to yield useful results if the population is thin, unless it be around the Field Stations. In regard to the plants found in the areas surveyed, all the commoner ones have now been collected and identified, but an accurate analysis of the plant associations in particular areas has yet to be made in detail.

The need for central laboratories for working out the details of the problems met with in Field stations has been rightly stressed, and there is little doubt that there is a great necessity of some of the fundamental problems being taken up and solved wherever facilities for investigation are existent.

" While the subject of controlling locust swarms in flight by aircraft is a fascinating one, the general indications are that in the present stage of development of the method, it is not likely to be of practical value in India.

" The standardisation of biometrical methods in the examination of locusts is of great value, since the ratios expressed by various workers—adopting different systems of measurements—have been rather confusing and misleading, as the biometrical values were not comparable.

ACKNOWLEDGMENTS.

" I take this opportunity of acknowledging my gratefulness to the various authorities in Sind, Bahuchistan, Rajputana, Western India States, Punjab States and the Punjab for the ready help rendered to the Locust Survey staff during their tours in the areas under their jurisdiction and for the loan of Locust records for perusal. Similar help was received also from the Durbars of Kalat, Lasbela, Bikaner, Jaisalmer, Jodhpur, Bahawalpore, Khairpur, Cutch and Jaipur, and I acknowledge my thankfulness to them. The thanks of the Locust Research Department are due to Dr. S. K. Pramanik, Meteorologist, Karachi, and his staff for the unfailing help received from them on various occasions in regard to meteorological information, and for the loan of Thermometers, etc., for the screen at Chachro for recording meteorological data there. I wish also to express my indebtedness to Dr. C. W. Normand, Director of Meteorological Observatories, and Dr. L. A. Ramdas, Agricultural Meteorologist, Poona, for advice in regard to micro-climatic and meteorological observations in progress under me. I should personally express my gratefulness to Sir, Guy A. K. Marshall, Director, Imperial Institute of Entomology, London, and to Mr. B. P. Uvarov, Senior Entomologist, for facilities provided to me and help rendered in connection with biometrical work at the Institute, and for the identification of numerous insect specimens. My thanks are due to Mr. P. B. Richards, Government Entomologist, Cawnpore, for the loan of plans and for advice given in regard to the erection of a large cage at Pasni, to Mr. M. Afzal Husain for the loan of files on the Punjab Locust data for years prior to 1925, to the Imperial Entomologist, Pusa for a loan of his files on the Desert Locust, and to the Director of Records, Bombay, for the loan of the old volumes of the Bombay Gazette, and the Curator, Royal Botanic Garden, Calcutta, for identifying the plants sent.

" In conclusion, I wish to thank all the staff engaged on Locust Research work for carrying on work vigorously during the year in spite of the handicaps of a desert environment.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORK.

Owing to the adverse rainfall conditions in winter and spring in the Baluchistan area during 1934 and to the somewhat deficient summer rainfall in Lasbela, there was a great diminution of the locust population in south Baluchistan in general. Even in Rajputana, where rainfall has approximated to normal this year, there does not seem to have been an increase of population, such as had been observed last year. In Rajputana, rainfall in the spring season seems to be of great importance not only in bringing about a numerical increase, but also in helping concentrations of locusts to form.

Since the ultimate aim of our scheme is the delimitation, within British limits, of all those areas actually capable of giving rise to migratory swarms, the present year's drought has given us a set-back, and our goal has apparently receded further back than last year. In fact, for want of locust material, even the very existence of the Pasni Field Station has been threatened and at the moment of writing, the prospects are very gloomy indeed, though a spurt of good rainfall during this winter may possibly bring about interesting developments.

The following general programme is submitted for adoption next year.

1. *Ecological Work*.—A continuation of the work at Pasni and Ambagh with the present staff, and with certain additions.

The present scheme of having a survey Assistant stationed at Karachi has not worked well this year and the Assistant Locust Research Entomologist, Pasni, suggests the appointment of a biologically qualified scientific Assistant—preferably with a training in meteorological work—to be stationed at Pasni for supervising survey work in Mekran, which is undoubtedly of great importance. At present there is a shortage of staff at Pasni and the appointment of one more Fieldman and a Peon for the Locust Research Assistant stationed at Pasni is suggested.

2. *Survey Work*.—From the results of the last two years, it is apparent that the greater part of the Indus Valley cannot be called a reservation area in the real sense, since locusts have been found only sporadically there. Most of the area is, moreover, an alluvial plain with only a few scattered sandy areas. In regard to the sandy areas near Dera Ghazikhan, where a breeding of the non-gregarious form of the locust has been noted during the last two years, they are apparently some sort of reservations, but as they are restricted in extent, they may not function as out-break centres.

Most of the locusts found during surveys have been obtained from areas within the great Indian Desert—which doubtless forms a huge reservation area for the locust. Since the whole area is sandy and full of vegetation during the rains, those portions that receive good and prolonged rainfall might function as out-break centres. Intensive survey work at Chachro has given some interesting results this year, but Sardarshahr has proved rather disappointing on account of the disappearance of locusts round about the place. But even at Chachro the population of locusts noted during the year has not been comparable to that of the Mekran Rek areas (*vide* Statement E). However, the work at Chachro and Sardarshahr might be continued for another season.

I would suggest that during the year 1935, the area to be kept under survey might be limited to the desert area and the desert fringes, thus eliminating a great part of Sind and Bahawalpore. The staff withdrawn from these

areas might be utilized for having one or two more centres like Chachro. Important areas in Sind, like Dadu and Larkana districts, might be visited once or twice a year at the time of breeding.

3. *Headquarters.*—The recommendations of the Locusts Conference lay special stress on the establishment of Central Laboratories and I should recommend that this might be seriously considered this year. In case it is approved, detailed proposals will be submitted.

The Compiling Staff.—Most of the compiling has now been finished, and the mapping of the movements can now be taken up after a chronological arrangement of the material collected. At the same time, all available meteorological data would also be obtained for the recent locust cycle for purposes of correlation. The addition of a Draftsman would greatly help mapping and enable copies of the maps being prepared for record and distribution.

Publication work.—It is necessary that some time should be devoted during the coming year to the writing up of the results of the survey work and of the results of the study of old locust records.

Detailed estimates will be submitted for the coming year separately.

STATEMENT A.I.

Details of Tours of Survey Parties.

I.—Khanpur Circle.

No.	Time of tour.	Personnel touring.	District.	Route followed.
1	6th to 16th January 1934.	Mr. Keshodas Bawoja and Fieldman Deokinandan.	Bahawalpore	Ahmadpur, East, Dunga-Bunga, Fort Abbas, and Khanpur.
2	9th January to 10th February 1934.	Bikaner Fieldman Narayan Behari.	Bikaner and Jodhpur State.	Bikaner, Nagaur, Merta, Jodhpur, Phalodi, Sujargarh and Sardarshahr, Nohar, Suratgarh, Lunkaransar and Bikaner.
3	17th February to 29th March 1934.	Assistant Mr. Bawoja and F. M. Bikaner.	Bikaner, Jaisalmer and Sukkur areas.	Suratgarh, Sri Bijonagar, Anupgarh, Rojri, Sattasar, Pugal, Jodasars, Barsilpur, Goru, Bikampur, Nachna, Tarana, Mohangarh, Jaisalmer, Chatral Khuiala, Asutala, Shahgarh, Lung, Tibba, Bharpurtha, Piarowaro Tar, Mamro and Rohri.
4	16th February to 22nd March 1934.	Khanpur Fieldman Deokinandan.	Bahawalpore	Rahim Yarkhan, Wah Faqiran, Ahmadpur East, Dorawar, Bahawalpore, Khairpore, Dunga Bunga, Fort Abbas.
5	16th to 20th April 1934.	Assistant Mr. Bawoja	Bahawalpore	Panjnad area, Mastoi, Allahabad.
6	8th April to 7th May 1934.	Bikaner Fieldman Narayan Behari.	Bikaner State	Bikaner, Sujargarh, Sardarshahr, Billun Nohar, Suratgarh, Mahajan, Lunkaransar, Badrasar, Bandralla and Surasar, Bikaner.
7	7th May to 3rd June 1934.	Mr. Bawoja, and F. M. Khanpur.	Bahawalpore	Rahim Yarkhan, Wah Faqiran, Ahmadpur East, Bahawalpore, Bahawalnagar, Fort Abbas, Fort Maret, Khanpur.

STATEMENT A-II:

Details of Tours of Survey Parties.

II.—Mirpurkhas Circle.

No.	Time of tour.	Personnel touring.	District.	Route followed.
1	1st to 10th January 1934.	Assistant Mr. Desraj Bhatia.	Western Sind .	Kotri, Chuharlak, Thano Bulakhan, Larkana, Akil, Rohri.
2	19th January to 15th February 1934.	Mirpurkhas Fieldman Didarsingh.	Jodhpur State	Barmer, Sarli; Sindhri, Padru, Dhanas, Bhinmal, Ramsar, Siana, Jalore, Bhadravan, Siwana, Balotra.
3	29th January to 20th February 1934.	Mr. D. R. Bhatia .	Kachhi and Sind.	Rohri, Bellput, Kunderi, Lehari, Bhag, Gandhawa, Nuttall.
4	25th February to 8th April 1934.	Mr. Bhatia and Mirpurkhas F. M.	Jodhpur-M a lani and Sind-Thar-Parkar District.	Barmer, Malpura, Nagarkhas, Dhori-mana, Chitalwana, Sanchor, Bhavatra Harrah, Virawah, Nagar-Parkar, Jhangro, Islamkot, Chachro, Chellar, Mithi, Diplo, Kurkasar, Suro, Rahimkibazaar, Kalohi, Naokot, Jhuddo, Mirpurkhas.
5	11th April to 12th May 1934.	Rohri, Fieldman Abdul Latif.	Western Sind .	Sehwan, Bubak, Shah Hassan, Tando, Rahimkhan Johi, Hairokhan, Tharri, Mehar, Mirzapur, Bago-dero, Shadadkot, Garhi Khairo, Dodapur, Larkana Akil, Rohri.
6	27th April to 7th June 1934.	Mr. D. R. Bhatia .	Cutch State and Thar-Parkar.	Mirpurkhas, Karachi, Mandvi, Bhuj, Sumrasar, Khavada, Mitti Well, Baliari, Diplo, Mithi, Chachro, Tar Ahmed, Khisar, Gadro.

II. Mirpurkhas Circle, contd.

No.	Time of tour.	Personnel touring.	District.	Route followed.
7	22nd May to 22nd June 1934.	Rohri Fieldman	East Sind including Khairpore Stato.	Mirpur Mathelo, Khairpur Mirs, Sorah, Kotdiji Thari, Akra, Khewari, Rahwari, Khadro, Sanghar, Sinjhora, Khipro, Mirpurkhas.
8	10th to 24th June 1934.	Chachro Fieldman	Tharparkar	Misrishah, Dhodwero Virawah, Borleo, Islamkot, Erniaia.
9	26th June to 24th July, 1934.	Rohri, Fieldman	Western Sind	Kotri, Thano Bulakhan, Karclat, Jhangar, Larkana, Kashmir, Sui, Kandhkot, Rohri.
10	25th June to 31st July 1934.	Mr. D. R. Bhatia and Mirpurkhas F. M. (Peshawari Singh).	Tharparkar	Mirpurkhas, Umar-kot, Mohondoro, Chachro, Charnor, Dadusar, Chohatan, Dhorimana, Harpalia, Bakasar, Gundi, Doori Sutianji, Hayat-jot Tar, Dharandoro,, Dhakla and Chachro.
11	1st to 31st August 1934.	Mr. D. R. Bhatia	Tharparkar	Chachro, Misrishah Virawah, Jhangro, Islamkot, Kurkasar, Suro, Singal, Saran, Diplo, Mithio, Chellar, Chachro, Khisar, Gadro,, Mirpurkhas.
12	3rd to 26th August 1934.	Rohri Fieldman	Western Sind	Rohri, Bubak, Shah Hassan, Tando Rahimkhan, Johi, Hairokhan, Tharri, Mado, Mirzapur, Ghaibidoro, Kambar, Rohri.
13	13th September to 15th October 1934.	Fieldman Mirpurkhas.	Tharparkar, Jaisalmero and Jodhpur.	Mirpurkhas, Khipro, Hathoongo, Rana-hu, Mankahu, Mayajlar, Gura, Lakha, Sheo, Bhatka, Barmer, Sanawra, Dhorimana, Bhalikhal, Sindhri, Padru, Balotra, Hyderabad.

II.—Mirpurkhas Circle—*concl'd.*

No.	Time of tour.	Personnel touring.	District.	Route followed.
14	8th to 24th October 1934.	Rohri Messenger .	Sukkur, Khairpur State.	Rohri, Kotdiji, Bozdar, Sanero, Akro, Khewari, Tujjal, Sorah, Kotdiji, Rohri.
15	27th September to 26th October, 1934.	Mr. D. R. Bhatia .	Tharparkar Cutch State.	Mirpurkhas, Umar-kot, Kantio, Chachro, Hayat-jo-Tar, Pilo-jo-Tar, Nagarparkar, Bela, Rapar, Bhachau, Anjar, Mundra, Mandvi, Karachi, Hyderabad.
16	1st to 13th November 1934.	Rohri Fieldman .	Sukkur .	Mirpur Mathelo, Yaru Land, Dharau, Piarowaro, Tar, Mamro, Rohri.
17	17th November to 3rd December 1934.	Rohri Fieldman .	Dadu District .	Dadu, Hairokhan, Tharri, Mado, Mirzapur, Ghaidero, Kambar.
18	29th October to 6th November 1934.	Chachro Fieldman .	Tharparkar .	Tar Charnor, Paboonjo Tar, Chapur, Bugal, Bhadee, Chachro.
19	18th November to 3rd December 1934.	Hyderabad Fieldman Peshawari Singh.	Tharparkar Jodhpur State.	Hayat-jo-Tar, Gundi, Tar Charnor, Khisar, Gadra, Barmer, Balera, Chohtan, Dedusar.
20	11th November to 5th December 1934.	....	Jodhpur Jaisalmero.	Barmer, Malpura, Gurha, Makna-kata, Chohtan, Bhachbhar, Sheo, Lakha, Deora, Phulia, Mayajlar, Lilma.

STATEMENT A-III.

Details of Tours of Survey Parties,

III.—Mekran Area.

No.	Time of touring.	Personnel touring.	District.	Routes followed.
1	25th December 1933 to 2nd January 1934.	Turbat Fieldman, Nasrullah.	Keoh Valley	Turbat, Nasirabad, Turmp, Mand, Bal, Kuhak, Kanisar, Turbat.
2	26th December 1933 to 7th January 1934.	Gwadar Fieldman, Muhd. Sharif.	Dasht Area Nigwar.	Gwadar, Kappar, Kanisar, Pittu, Shahzangi Kalat, Kuhak, Zarinbug, Suntsar, Gwadar.
3	11th February to 3rd March 1934.	Dr. Karandikar, Mr. Mirza Ahmed Ali Khan, Gwadar Fieldman (upto Kuntdar and the Turbat Fieldman afterwards).	Dasht Valley, Keoh Valley, Shadikaur Area.	Gwadar, Pishukan, Jiwani, Gabd, Puthan, Bishuli, Kuntdar, Turbat Pidarak, Ghulamani Bont, Pasni.
4	16th to 28th February, 1934.	Gwadar Fieldman	Dasht Nigwar	Gwadar, Pishukan, Jiwani, Gabd, Puthan, Bishuli, Kuntdar, Shahzangi Kalat, Kuhak, Ban, Kappar, Gwadar.
5	18th to 31st March 1934.	Turbat Fieldman	Keoh, Panjgur Buleda.	Sami, Hoshap, Tash, Guani, Sudan, Panjgur, Parom, Sarparom, Palan Goz, Buleda, Turbat.
6	17th to 21st March 1934.	Pasni Fieldman	Kulanch Area	Sardasht, Nokbur, Saur Kaur, Zintup, Chur Bundar, Pasni.
7	8th to 16th April 1934.	Ormara Fieldman	Ormara Area	Sanarichah, Kalmat, Gazdan, Razak, Kandilak, Ormara.
8	17th to 30th April, 1934.	Turbat Fieldman	Kolwah Area	Turbat, Sami, Hoshap, Rodkan, Chambarikalat Goshanak, Awaran.
9	2nd to 6th April 1934.	Gwadar Fieldman Abdul Hamid.	Pishukan Area	Gwadar, Pishukan, Jiwani and back.

III.—Mekran Area—*contd.*

No.	Time of touring.	Personnel touring.	District.	Routes followed.
10	25th April to 22nd May 1934.	Assistant Mirza Ahmed Ali Khan and Fieldman. (Turbat Fieldman joined him at Awaran; the tour was carried on motor lorry in the Mekran Area).	Lasbela, South Jhalawan Kolwah, Panjgur, and Kech Valley.	Karachi, Bela, Goko Pat, Mar Kaur, Nundara, Awaran, Hor Kalat, Hoshap, Saidan, Panjgur, Balgattar, Turbat, Nasirabad, Mand, Tump, Turbat, Pasm.
11	8th to 18th May 1934.	Gwadar Fieldman.	Dasht Nigwar	Pishukan, Jiwani, Gabd, Puthan, Bishuli, Kuntadar Shahzargi, Kalat, Kuhak, Ban, Kappar, Gwadar.
12	4th to 8th June 1934.	Gwadar Fieldman.	Pishukan Area	Gwadar, Pishukan, Jiwani and back.
13	5th to 14th July 1934.	Ormara Fieldman.	Ormara Area	Rumro, Nakola, Basole, Ormara.
14	4th to 8th July 1934.	Gwadar Fieldman.	Pishukan Area	Gwadar, Pishukan, Jiwani and back.
15	24th July to 14th August 1934.	Turbat Fieldman.	Kech, Kolwah, Panjgur, Buloda.	Turbat, Sami, Hoshap, Rodkan, Chambarkalat, Goshanak, Awaran, Kaur Dhat, Godri, Salori, Mitha Sing, Panjgur, Thana Daugh, Shakra, Kirki, Buloda, Turbat.
16	23rd August to 3rd September 1934.	Ormara Fieldman.	Ormara Area	Nokbur, Ghulamani Bont, Rumra, Makola, Basolo, Ormara.
17	14th to 26th August 1934.	Gwadar Fieldman.	Dasht-Nigwar	Gwadar, Pishukan, Jiwani, Gabd, Puthan, Bishuli, Kuntadar, Shahzangikalat, Kuhak, Ban, Kappar, Gwadar.
18	3rd to 12th September 1934.	Turbat Fieldman.	Kech Valley	Turbat, Nasirabad, Mand, Tump, Kallag, Buloda, Turbat.
19	4th to 7th September, 1934.	Gwadar Fieldman.	Pishukan Area	Pishukan, Jiwani, Ganz and back to Gwadar.

III.—Mekran Area—*concl'd.*

No.	Time of touring.	Personnel touring.	District.	Routes followed.
20	26th October to to 12th No- vember 1934.	Turbat Fieldman (Khushi Muihd.).	Keoh, Parom, Buleda.	Nasirabad, Tump, Mand, Aspikan, Wakai, Purchinan, Singisi, Parom. Dar, Dumugh, Buleda, Turbat.
21	10th to 14th October 1934.	Gwadar Fieldman .	Pishukan Area	Pishukan, Jiwapi and back to Gwa- dar.
22	13th to 21st October 1934.	Mr. A. C. Sen and Fieldman.	Nigwar-Kulanch	Pasni, Kandasole, Kappar, Gwadar.
23	3rd to 14th No- vember 1934.	Gwadar Fieldman .	Pishukan-Dasht- Nigwar.	Pishukan, Jiwani, Gabd, Pothan, Bishuli, Kuntlar, Shahzangalat, Kuhak, Ban, Kappar, Gwadar.

STATEMENT A-IV.

Details of Tours of Survey Staff.

IV.—Lashela Area.

No.	Time of touring.	Personnel touring.	District.	Routes followed.
1	5th to 18th March, 1934.	Sonmiani Fieldman	Hingol Area.	Bannodi, Badda Nakhotri, Khande- wari, Sangal, Hingol, Dhak Sapat, Pohr, Khidar Hayat, Damb, Ambagh.
2	16th to 27th April 1934.	Sonmiani F. M. (Khushi Muhd.).	Bela Area	Liari, Lhakhra, Khaddi, Bola, Thappi Thana, Wah Yara, Uthal, Shaikhraj, Ambagh
3	22nd May to 5th June 1934.	Ambagh Fieldman (Muhd. Shafi).	Hingol Area	Bannodi, Buddo Nakhetri, Khande- wari, Sapat, Sangal, Hingol, Chandragup, Pohr, Ambagh.
4	16th to 29th June 1934.	Fieldman Naurata Singh.	Hinidan Area	Miran Pir, Got Sherkhan, Shah Bilawal, Hinidan, Kila, Pabuni, Ambagh.
5	13th to 23rd July 1934.	Fieldman Khushi Muhammad.	Hingol Area	Nakhetri, Khande- wari, Sangal, Manjwari, Hingol, Chandargup, Sapat, Pohr, Ambagh.
6	19th to 29th August 1934.	Fieldman Khushi Muhammad.	Bela Area	Liari, Shah Lakhna, Khaddi, Sarish, Thappi Thana, Wah Yara, Uthal, Shaikhraj, Ambagh.
7	15th to 26th September 1934.	Fieldman Ambagh	Hingol Area	Gagu, Bannodi, Bud- da, Dambh. Nakhetri, Khande- wari, Sangal, Manjwari, Kund, Hingol, Chandra- gup, Sapat, Pohr, Sonmiani, Ambagh.
8	23rd to 29th October 1934.	Ambagh Fieldman	Hinidan Area	Got Shorkhan, Shah Bilawal, Hinidan, Kila, Naka Pabuni, Ambagh.
9	16th to 30th November 1934.	Ambagh Fieldman	Hingol Area	Bannodi, Tappo, Churani Kaur, Khandowari, San- gal, Manjwari, Kund, Sapat, Pohr, Baddo.

STATEMENT B-1.

Statement showing details of Locust Findings.

Months.	Mekran Rek Areas.						Lasbela Area.														
	Gwadar Rcks.		Pishukan-Jiwani Rcks.		Pasni Rcks.		Ormara Area.		Ambagh-Naka Kharati.		Hingol Area.		Bela Area.		Hindan Area.						
	L. D. S.	Av.	L. D. S.	Av.	L. D. S.	Av.	L. D. S.	Av.	L. D. S.	Av.	L. D. S.	Av.	L. D. S.	Av.	L. D. S.	Av.					
January 1934 .	6	3	2'00	Not surveyed.		30	7	4'28	No surveys.		83	8	10'37	Not surveyed.		Not surveyed.					
February .	18	3	6'00	10	3	3'33	63	7	0'28	No surveys made.		80	0	8'88	Not surveyed.		Not surveyed.				
March .	93	8	12'25	No survey.		32	7	7'42	Not surveyed.		72	8	9'00	98		8	12'25	Not surveyed.			
April .	38	4	0'50	48	3	9'00	75	0	12'50	10	7	1'23	Not surveyed.		2 (found near Lahr)		Not surveyed.				
May .	13	1	13'00	39	3	13'00	40	0	5'11	Not surveyed.		10	3	3'33	72		9	8'00	Not surveyed.		
June .	74	7	10'57	53	5	11'00	38	0	4'22	Not surveyed.		9	7	1'29	Not surveyed.		3 (at Hindan)				
July .	13	6	7'16	33	5	7'00	7	0	0'77	No locust.		14 (including 4 hop pers).	22		8	1'75	Not surveyed.				
August .	4	3	1'33	0	3	2'00	2	3	0'10	No locust.		14 (including 9 hoppers)	Not surveyed.		Nil		7	0'00	Not surveyed.		
September .	2	2	1'00	2	4	0'50	3	10	0'30	23rd August to 3rd September		30	2'14		33		10	3'30	Not surveyed.		
October .	1	3	0'33	1	5	0'20	No locust.		5	0'00	42	11	3'81	Not surveyed.		Nil		5	0'00	Not surveyed.	
November .	No locust.		2	1	0'00	No locust.		0	0'00	Not surveyed.		23	11	2'27	22		8	2'75	Not surveyed.		

L. = No. of locusts observed during the month.

D. S. = No. of Day surveys during the month.

Av. = Average No. of locusts observed during a day's survey.

'STATEMENT B-2.

Details of Locust Findings.

Mekran Hinterland.

Period.	Kilnch.	Locust	Dasht-Nigwar.	Locust	Keechi Valley.	Locust	Kolwah Valley.	Locust	Panjgur.	Locust	Kachhi.	Locust
Winter.	I—xii—33.		Tour III—(2) 26-xii 33—7—7—34		Tour III (1) 25-xii 33 to 2—1—34.						Tour II (3) 1- 17—1—	
December to Feb- ruary.	XII Khandasole- Kappur. 13—xii—11—xii. Chakuli Khandasole	4 3	XII 26-xii Kappur 27-xii Ban 28-xii Kunisar 31-xii— 1—34 Pritu. Tour III (1)—16-ii— 28-ii II. 26-ii. Kuhak to Ban. Tour III (11)—11- 17—34.	1 1 1 3 0	XII 25-xii Turbat Khandasole. 27-xii Pritu. 28-xii Kunisar. 29-xii. Mand. I. 24-34. Kunkar Turbat.	2 5 1 2	Not surveyed		Not surveyed		II. Bellmit, Kuneri, Leheri ibag, Gandana. Nil.	
Spring.	Tour III—(6)—17-31 tu-34.		V. 12-v. Puthan- Bebuli. 10-v. Kurbak. Ban. 17-v. Ban-Kappur.	1 0 3	III. 18-iii Sami . Tour III (7). IV. 17-iv. Sami . Tour III (10) 30-iv 18-v-14.	2 Nil. Nil.	Tour III (9)—18- 24-iv. IV. Hoshup, etc. 24-iv. Awarun . Tour III (10) 1-7-v V. Kolwah Area.	Nil. Nil.	Tour III (5)—18- 31 iii. III. 21-iii. Thah 24-iii Panjgur 20-27-iii. Parom Sar-Parom. 31-iii. Bulefo. Turbat. Tour III (10)—3-6-v.	2 1 3 2		
March to May.	III. Sardasht- Nokbur.	Nil.				Nil.			V. Saldan-Panjgur	Nil		
Summer.			Tour III (17)—16- 27-vii.		Tour III (15) 25 31-vii.				Tour III (15)—1 11-vii			
June to August.	VIII. 24-viii. Kuhak to to Ban.	VIII.		1	VII. 1-15-viii. Turbat . 24-viii. Sami .	2 2 Nil.	VII. 29-27-viii. Roddan . 30-viii. Goshan- ak-Awarun 31-viii. Awarun	2 2 2	VIII. 5-viii Saldan 6-viii. Jithbas- ing. 10-7. Thana 11-viii. Shikrak 14-viii. Buleda— Turbat.	1 2 3 2 2		

11 mth.	Tour III (22) 13-17-x.	Tour III (23) 5-13-xi.	Tour III (18) 3-10-12.	Tour III (20) 26-x-12-xi.	Tour III (20) 31-x-12-xi.	
September to November	X. Kandahole Nil	XI. Gab to Kappar. Nil	IX. 6-xi. Mand. Tour III (20) 26-x-12-xi. X. 28-x. Nactra-bud-Tump 29-x. Tump 30-x. Tump to Mand.	2 1 2 3	XI. 1-xi. Wakel 8-xi. Parom. 11-xi. Rudega. 3 4 2	

STATEMENT B-3.

Details of Locust Finding.

Northern Desert areas of North-West India.

Period.	South- West Punjab.		Rajputana.		North Jodhpur.	Jaipur.
	Dera Ghazi Khan District.	Bahawalpur Area.	North Jaisalmer.	Bikaner.		
Winter Season. December 1933 to February 1934.	Not surveyed.	Tour (1) 6-16-i. I. Fort Alib in Area	Nil	Tour I (2) 9-31-i. I. Bikaner-10-11-i	November 1933 Phalodi. Tour I (2) 9-31-i.	
		Tour II (1) 16-i to 17-iii.	Not surveyed.	Tour I (3) 17-i to 25-iii		
		II. 14-ii. Rehar Yar Khan. 20-ii. Wadi Eadharan. 26-ii. Ahmedpur East.	1 1 2	II. 12-ii. Bikaner. 19-ii. Surwarth. 21-23-ii. Sri Bikaner. 23-24-ii. Anupwarth. 26-ii. Rojri. 24-ii. Phalodi. Tour I (4) 1-16-7e.	I. Nagar. Phalodi, etc. Nil.	
		III. 17-18-ii. Fort Alibay. Tour I-(5) 16-26-iv IV. 17-iv. Mastol Tour I (7) 7-v to 3-vi. V. 10-v. Fackran. 10-v. Ahmedpur East.	1 1 1 1	IV. 1-iv. Bikaner. 9-iv Sri Kotoyaji 11-iv. Surlugath. V. 2. v. Indrasar 6-v. Surasar. Tour I (8) 17-v to 9-vi. V. 19-v. Bikaner 10-v. Xapasat, etc. 22-v. Surwarth. 30-31-v. Rojri.	3 1 1 8 1 1 1 5 1 0	
Spring Season. March to May.	Not Surveyed.		Tour I (3) 19-ii to 27-iii. III. 7-iii. Bikaner. 8-9-iii. Nachina Other places. Nil. Tour I (6) 1-17-7v			

Summer Season.	Tour I(10) 13-27-vi	Tour I (13) 27-viii to 11-viii.	Tour I (11) 13-30-vi.	Tour No. I (11) 13-30-viii.	
June to August.	VI 21-vi. Dera Ghazi Khan	VII-VIII— Sura Dabhar Islamgarh Tour I (14) 4-7-viii. VIII. Shalkh Wahan.	VI— 19-21-vi. Nokh 22-24-vi. Baru Khern. Tour I (13) 27-viii to 11-viii. VIII. 6-7-viii. Bhutan Wala	VI— 2-4-vi. P. r. r. l. 6-7-vi. Badkisar. 9-12-vi. Bikaner. Tour I (11) 15-vi- 29-vi. VII. 5-10-vi. Sardarsahr Tour I (16) 13-30- viii. VIII. 21-viii. Sardar. shahr (new brood) 26-viii. Pusal 28-viii. Rojri (new brood).	2 1 4 3 1 1 20 1 1 1 1 1
Autumn Season.	Tour I (21)-27-x	IX— Roda, Toha Rell-iv. Fort Narer	Tour I (15) 4-21-viii. VIII— 4-5-viii. Nokh 11-viii. Nakhana 14-viii. Bikaner. pur.	IX— 6-1 x. Bikaner (new brood). 9-1x. Sardarsahr Tour I (21) 20-x-17-xi. X-20-x. Hardesar XI-2-xi. Piplasar Tour I (22) 11-29-xi. 21-vi. Sardarsahr	1 1 1 1 1 1
September to November.	X. 28-31-x. Dera Ghazi Khan. adults : 26H. XI—1-xi. Taunsa adult. 2-xi. 11th Kasrani Adults : 97 Hoppers : H	Tour I (18) 1-7-x. X. Chachran. etc.	X. X.	Jaipur Jaipur	6 Nil. Nil. Nil. Tour I (18)-16 16-x to 29-xi. IX : Jaipur State. Nil

STATEMENT B-4.

Details of Locust Findings.

Southern Desert Areas.

Period.	Western Sind.	Sind.	Thar Parkar.	South Marwar Malahani.	Rajputana South Jaipur.	W I States Cutch.	Loc.
<i>Winter Season.</i>							
December to February.	Tour II (1)-1-10-1. I Larkhan	Tour I (1)-17-ii to 23-iii. III. Sukkur Desert area (Pharewaro far-Kohir).		Tour II (2) 19-i-13-ii. 1. 20-i. Barmer . 24-i. Sindh . 20-i. Padra . 28-i. Dhanas . 31-i. Bhimmal . II. 2-ii. Ramgar . 3-ii. Sini . 7-ii. Bhadravan . Tour II (3) 27-i-9-ii. II-III.—Mallahani Area			
<i>Spring Season.</i>							
March to May.	Tour II (1)-11-iv. IV.—12-iv. Seliwan (Yellow) 13-iv. Tando-Rahimkhan (Pink) 20-iv. Hairo Khan 22-iv. Tharri . 30-iv. Mirzapur	Tour II (7) : 22-v-23-ii. V-VI.—Khairpur Area Nawabshah district.	Tour II (4) : 9-ii-13-iv. III-IV.—Nagar Parkar, Chachro, Diplo, Mithi Talhar. Tour II (5) : 12-v-20-v. 19-v. Chachro outpost.			Tour II (6) 30 iv-10-v-33. V. 1-v. Mandvi, Bhuj, Khavda etc.	3 Nil.
<i>Summer Season.</i>							
June to August.	Tour II (2) 1-24-vii. VII. Dadu, Larkhana and U. S. I. Districts. Tour II (12)-3-26-viii.		Tour II (10) 26-vi-31-vii. VI. 29-vi. Mohendero. 1-30-vi. Chachro outpost. VII. 12-vii. Chachro.				

STATEMENT D.

Monthly Rainfall Date for 1933.

Months.	Panjgur.	Gwadar.	Pasni.	Ormara.	Bele.	Ambagh.	Karachi.	Chachro.	Sardar-shahr.
January	0.32	2.37	0.24	0.39	0.01	..	..	..	..
February	1.68	5.88	6.09	3.50	0.56	0.46	0.01	..	0.75
March	1.37	6.70	0.17	0.03	..	..	..	0.20	..
April	1.49	3.30	5.37	3.02	0.65	0.50	0.14	0.60	..
May	0.14	..	..	..	1.34	..	0.91	0.70	0.44
June	0.30	..	..	..	..	..	..	0.63	1.62
July	1.62	..	0.67	0.91	4.58	9.50	15.50	4.78	0.68
August	0.02	..	0.02	0.50	2.60	2.20	3.44	3.11	6.80
September	..	..	..	0.06	3.56	1.70	2.67	1.20	2.32
October	..	..	..	..	..	..	..	..	..
November	0.03	0.46	..	..	..	..	..	..	..
December	..	..	0.03	..	..	..	..	..	..
Total	7.26	12.71	12.59	8.41	13.30	14.36	22.67	11.24	12.61

STATEMENT E.

Comparative Statement of Locust Population noted during the year 1934 at Stations under intensive Survey work.

Months.	Gwadar.			Pasni.			Ambagh.			Chachro.			Sardarshahr.			Remarks.
	L.	D.S.	Av.	L.	D.S.	Av.	L.	D.S.	Av.	L.	D.S.	Av.	L.	D.S.	Av.	
January 1934	6	3	2.00	30	7	4.28	83	8	10.37							L.—Number of Locusts observed during the month. D. S.—Number of Day-survey. Av.—Average number of locusts observable during a day's survey.
February	18	3	6.00	65	7	9.28	80	9	8.88							
March	98	8	12.25	32	7	7.42	72	8	9.00							
April	38	4	9.50	75	6	12.50	6	6	1.00							
May	13	1	13.00	46	9	5.11	10	3	3.33	Work begun in May 1934.			Work begun in July 1934.			Av.—Average number of locusts observable during a day's survey.
June	71	7	10.57	38	9	4.22	9	7	1.28	1	15	0.07				
July	43	6	7.16	7	9	0.77	14	11	1.27	5	15	0.33	3	15	0.20	
August	4	3	1.33	2	5	0.40	30	14	2.14	(Hop-pers present.)	(Hop-pers present.)		1	15	0.07	

September	.	2	2	1.00	3	10	0.30	99	14	7.07	58	28	2.07	1	15	0.07
October	.	1	3	0.33	0	5	0.00	42	11	3.81	37	13	2.81	0	15	0.00
	.										(A few hopper.)					
November.	.	0	2	0.00	0	6	0.00	25	11	3.81	10	15	0.66	1	15	0.07

STATEMENT F.

Monthly averages of the Daily Maxima and Minima of Meteorological Observations on the Ambagh Rek from May to November 1934.

	April.	May.	June.	July.	August.	September.	October.	November.
Screen. Temperature	81.2±16.4	81.3±10.7	85.8±7.3	86.35±4.65	85.7±4.2	83.3±6.9	78.8±11.7	73.0±16.8
Rel. Humidity.	60% ± 23	73% 20	76% ± 14	73% 7	80.5 % 11	81.5% 11.5	61.3% 22	65% 20
Open Air Temperature.		29.7 ± 1.8	30.5 ± 3.0	30.85±2.75	29.8±3.1	28.5±3.8	27.4±7.1	23.5±8.8
Sandy Soil Temperature (Open)		35.9±11.5	30.1±8.5	34.5±6.4	34.0±7.3	35.6±10.2	32.5±13.0	27.2±13.3
Vertical.		38.9±15.1	38.7±11.2	37±8.0	37.8±10.4	37.7±12.4	34.3±15.8	29±15.6
Horizontal.		36.3±6.0	37.7±6.8	34.55±4.45	35.4±2.1	31.3±5.1	31.2±6.3	26.5±7.1
2" Deep.		35.5±4.3	30.7±4.4	33.7±3	33.3±2.1	33.7±3.3	30.8±3.0	26.1±4.6
4" Deep.		35±2.8	35.0±2.0	33.1±1.0	33.2±1.3	33.2±2.2	30.6±2.5	25.8±2.9
6" Deep.								
Sandy Soil moisture.		.92%	1.95%	1.8%	.65%	.83%	.96%	.8%
2" Deep.		.85%	1.97%			1.34%	1.24%	.73%
4" Deep.		.60%	1.97%	1.2%	2.54%	1.71%	1.69%	.71%
6" Deep.		.75%	1.9%			1.82%	1.62%	.74%

Evapora- tion.	In Sun. In Shade.	11.4 c.c. 7.3 c.c.	9.7 c.c. 4.4 c.c.	10.6 c.c. 4.2 c.c.	9.1 c.c. 3.8 c.c.	9.4 c.c. 4.3 c.c.	10.4 c.c. 5.6 c.c.	9.8 c.c. 3.9 c.c.
Wind.	Total Mile- age in 24 hours. Maximum velocity (per hour).	128.5 mls. 11.5	144.2 10.4	173.4 11.6	140.2 10.5	118.92 10.08	51.5 6.8	27.5 3.2
	Barometric variation.	Nil.	From 29.48 to 29.85	From 29.5 to 29.8	From 29.63 to 29.99	From 29.8 to 30.09	From 29.91 to 30.25	From 29.88 to 30.18
	Rain.	No rain.	2.16"	1.1"	0.97"	No rain.	No. rain.	Total rain = 4.23"

STATEMENT G.

Statement showing the Hoppers found during 1934 in Thar-Parkar Deserts Areas.

District.	Locality.	Date.	Number of hoppers found.						Remarks.
			I stage	II	III	IV	V	Total.	
Thar-Parkar.	Hayat-jotur	29-7-34	1	2	2	5	First breeding.
	Dharan Dero	30-7-34	8	1	..	..	..	9
	Dhakla	31-7-34	..	1	..	..	..	1
	Kantio	6-8-34	3	3	2	..	..	8
	Misreeslah	8-8-34	2	..	..	..	..	2
	Virawah	11-8-34	..	..	..	..	1	1
	Chachro	1-8-34	2	..	..	..	..	2
		6-8-34	3	..	1	..	..	..
		7-8-34	..	..	..	1	2	3
		8-8-34	5	5	1	..	..	11
		10-8-34	2	2	..	1	2	7	
		11-8-34	5	..	7	..	..	12
		12-8-34	1	1	Second (?) breeding.
		13-8-34	..	..	..	1	..	1
		14-8-34	..	..	..	1	1	2
		20-9-34	..	..	..	1	..	1
		5-10-34	..	..	..	1	..	1
		15-10-34	..	..	..	..	1	1
Total at Chachro			17	7	9	6	7	46	
Total at places other than Chachro.			14	7	4	..	1	26	
GRAND TOTAL			31	14	13	6	8	72	

D. R. BHATIA,
*Locust Research Assistant,
 Mirpurkhas Circle.*

Statement showing the Staff employed under the Locust Research Entomologist to the Imperial Council of Agricultural Research, Karachi, during 1934-35.

Name and designation.	Date of appointment.	Present pay (On 1st Dec. 1934).	Remarks.
1. Rao Sahib Y. Ramchandra Rao, M.A., F.R.E.S., Locust Research Entomologist, Karachi.	13th Dec. 1930.	Rs. 1,000 plus Karachi Local Allowance Rs. 60 per mensem.	On Foreign Service.
2. Mirza Ahmed Ali Khan, Locust Research Assistant.	11th Jan. 1931.	Rs. 160 plus Rs. 15 Karachi Local Allowance.	Do.
3. Mr. Abdul Ghani, Head Clerk.	13th Jan. 1931.	Rs. 130 plus Karachi Local Allowance Rs. 12-8-0 per mensem.	Do.
4. Mr. Mohammed Ramzan, Second Clerk.	1st May 1932.	Rs. 52 plus Karachi Local Allowance Rs. 7-8-0 per mensem.	
5. Mr. H. G. Shaikh, Third Clerk.	2nd Oct. 1933.	Rs. 37 plus Karachi Local Allowance Rs. 7-8-0 per mensem.	
6. Mr. Chandar Parkash, Compiling Assistant.	27th April 1933.	Rs. 67 plus Karachi Local Allowance Rs. 10 per mensem.	
7. Mr. Shanti Lal, Compiling Assistant.	1st June 1933.	Rs. 67 plus Karachi Local Allowance Rs. 10 per mensem.	
<i>Fieldmen.</i>			
1 Fieldman on Rs. 30	..	Rs. 30 plus Rs. 6 House Rent and Karachi Local Allowance.	
1 Fieldman on Rs. 41 including Rs. 10 Motor Lorry Allowance.	..	Rs. 41 plus Rs. 6 House Rent and Karachi Local Allowance.	
<i>Peons.</i>			
1 Peon on Rs. 18 plus Rs. 6 House Rent etc., per mensem.	..	Rs. 18 plus Rs. 6 House Rent and Karachi Local Allowance.	Local.
2 Peons on Rs. 17 plus Rs. 6 House Rent etc. each per mensem. (Including one peon for Mekran Survey Work.)	..	Rs. 17 plus Rs. 6 House Rent and Karachi Allowance.	
<i>B.—Survey Party.</i>			
1. Mr. Keshodas Baweja, M.Sc., Locust Research Assistant, Khanpur.	12th Dec. 1930.	Rs. 350 per mensem	On Foreign Service.
2. Mr. Desraj Bhatia, M.Sc., Locust Research Assistant, Hyderabad (Sind).	2nd Jan. 1931.	Rs. 160 per mensem.	

Name and designation.	Date of appointment.	Present pay (On 1st Dec. 1931).	Remarks.
<i>Fieldmen.</i>			
2 Fieldmen on Rs. 31 per mensem.	..	Rs. 31 per mensem.	
4 Fieldmen on Rs. 30 each per mensem.	..	Rs. 30 per mensem.	
1 Fieldman on Rs. 30 plus Rs. 4 House Rent etc. per mensem.	..	Rs. 30 plus Rs. 4 House Rent and Local Allowance per mensem.	
1 Messenger on Rs. 12 plus Rs. 4 per mensem.	..	Rs. 12 plus Rs. 4 House Rent and Local Allowance per mensem.	
7 Messengers on Rs. 12 per mensem each.	
1 Peon on Rs. 15 per mensem.	
1 Peon on Rs. 15 plus Rs. 4 House Rent etc., per mensem.	..	Rs. 15 plus Rs. 4 House Rent and Local Allowance per mensem.	
<i>C.—Pasni.</i>			
1. Dr. K. R. Karundikar, Ph. D., Assistant Locust Research Entomologist, Pasni.	18th Oct. 1931.	Rs. 370 per mensem.	
2. Mr. Atul Chandra Sen, M.Sc., Locust Research Assistant.	10th Jan. 1931.	Rs. 160 plus Rs. 75 Local Allowance.	
3. Mr. Abdul Halim, Clerk.	10th June 1932.	Rs. 52 per mensem.	
<i>Fieldmen.</i>			
4 Fieldmen on Rs. 41 each (at Pasni, Turbat, Ormara and Gwadar).	
2 Fieldmen on Rs. 21 each at Pasni.	
1 Peon on Rs. 18 at Pasni.	
3 Messengers on Rs. 10 per mensem each (at Ormara, Turbat and Gwadar).	
1 Water Carrier on Rs. 10 at Pasni.	
<i>Ambagh Laboratory.</i>			
1. Syed Mohammed Taqi Ahsan, M.Sc., Locust Research Assistant.	28th March 1931.	Rs. 125 per mensem.	
2 Fieldmen on Rs. 40 each.	
1 Fieldman on Rs. 30 per mensem.	
1 Messenger on Rs. 10 per mensem.	
1 Peon on Rs. 18 per mensem.	

